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(19) (CA) **CANADIAN PATENT** (12)

(54) CONNECTOR

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ABSTRACT OF THE DISCLOSURE

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This invention relates to a coupler for connecting a tube to an opening in a dialysate container which consists of a first cupped member having a tubular connector extending through the bottom thereof and axially thereof; a second cupped member having a tubular connector extending through the bottom thereof and axially thereof; said cupped members, when axially aligned and with their open ends opposed, being telescopable with respect to each other; said connectors of said cupped members having free ends, said free ends of said connectors being aligned in their respective cupped members and adapted to connect together in fluid-flow relation within the space defined by said cupped members as the cupped members are telescoped together, one of the cupped members being adapted to receive the connector of the other cupped member in spaced relation to its interior wall as the cupped members are telescoped together to connect said connectors as aforesaid.

FIELD OF INVENTION

This invention relates to appliances that are useful in the practice of peritoneal dialysis for persons who have suffered kidney failure.

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PRIOR ART

Continuous ambulatory peritoneal dialysis (CAPD) is a system of dialysis wherein a quantity of dialysate is admitted to the peritoneal cavity of a patient, permitted to remain there for a period of about six hours within which it performs its dialysis function and then drained from the peritoneal cavity. The step of admitting fresh dialysate to the peritoneal cavity is repeated after drainage. About two litres of dialysate is usually admitted to the cavity. A patient on the system is required to change the dialysate four or five times a day, six or seven days a week.

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The dialysate is preferably supplied to the patient from a plastic container and provision must be made for connecting and disconnecting the container to a tube through which flow can take place to or from the patient.

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With the peritoneal dialysate technique, peritonitis is a danger and extreme care must be exercised at the point of connection of the container and the tube to ensure that the dialysate solution does not become contaminated.

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Quite often, persons using the system are not themselves in the best of health and, therefore,



not capable of putting forth a good effort to make an efficient connection. They tend to fumble and to handle the parts of the connector more than is desirable and this can result in dialysate contamination and peritonitis.

It is, therefore, important to provide a coupler for connecting a tube to an opening in the dialysate container that can be manipulated and aligned with a minimum of effort and in a way wherein the connected parts through which dialysate flow will take place are not likely to be touched by the hands of the person making the connection.

SUMMARY OF INVENTION

A coupler, according to this invention, comprises a first cupped member having a tubular connector extending through the bottom thereof and axially thereof; a second cupped member having a tubular connector extending through the bottom thereof and axially thereof; said cupped members, when axially aligned and with their open ends opposed, being telescopable with respect to each other; said connectors of said cupped members having free ends; said free ends of said connectors being aligned in their respective cupped members and adapted to telescope together in fluid-tight relation within the space defined by said cupped members as the cupped members are telescoped together. The invention will be clearly understood after reference to the following detailed specification read in conjunction with the drawings.

PREFERRED EMBODIMENT

In the drawings:

Figure 1 is an illustration of a patient sitting while connected to a bag of dialysate;

5 Figure 2 is an illustration of a cupped member for a coupler according to this invention mounted at the neck end of a container for liquid with a cap therefor;

10 Figure 3 is a sectional illustration of the cupped member of Figure 2 with its cap applied thereto;

 Figure 4 is an illustration of two cupped members of a connector together with a cap that can be applied to one of the cupped members to maintain it in a sterile condition;

15 Figure 5 is an illustration of the cupped members of a coupler about to be interconnected;

 Figure 6 is an illustration of the cupped members of the coupler of Figure 5 in connected position;

20 Figure 7 shows a cupped member of the coupler illustrated in Figures 5 and 6 with its cap about to be applied thereto;

 Figure 8 is an illustration showing an alternative embodiment of the invention;

25 Figure 9 shows the coupler of Figure 8 in connected position and is partially in section to illustrate construction and relationship of parts; and

 Figure 10 is an illustration of cupped members of a still further embodiment of the invention;

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In Figure 1 of the drawings, a patient 10 is shown receiving dialysate from a plastic bag 12 that is suspended on a stand 14. The dialysate flows by gravity from the bag through the plastic tube 16 which is connected to a catheter permanently implanted in the patient's peritoneal cavity. The tube 16 is connected to the bag by means of a coupler generally indicated by the numeral 18. One part of the coupler has an external cupped member 20 that is attached to the outlet neck 22 of the plastic bag 12 and the other part of the coupler has a cupped member 24 that is attached to the free end of the plastic tube 16 so that the interconnection of the bag to the tube is made by joining the two parts of the coupler. A manually releasable clip 26 is mounted on the tube 16 and can be manipulated to pinch the tube to stop flow therethrough in the position illustrated in Figure 4. Alternatively, it can be released to permit flow through the tube. The construction and operation of the clip 26 is well known and will not be referred to in detail in the specification.

In use, the bag of dialysate 12 with its cupped member 20 is supplied to the patient with a cap 26 over the cupped member 20 as illustrated in the sectional view which is Figure 3 of the drawings.

It will be noted that cupped member 20 has an outside wall 21 that forms a skirt for the inside wall 22. It also has a tubular connector 28 that

terminates at the membrane 32 that extends thereacross and seals the contents of the container 12 in the container until broken as will be explained later. The inside of the outside skirt 21 of the cupped member 20 is threaded as at 34 to threadedly receive a wall 36 that is spaced inwardly from the outside wall 38 of cap 26.

Thus, the bag of dialysate 12 is sealed by the membrane 32 and the cupped member 20 has a cap that is threaded thereon and that has a skirt 38 that extends over and protects the free end of the outer surface of the outer wall of the cup member from undue handling contamination.

The whole container with its cap, as illustrated in Figure 3, can be manufactured and shipped in an outer soft plastic bag which further maintains sterility of the unit until required for use. These units can be shipped in sterile condition and maintained in sterile condition until removed from their outer plastic bag container in accordance with known handling technique.

The patient normally carries the tube 16 in a rolled up condition contained in a body pouch.

The cupped member 24 is permanently attached to the end of the tube 16. This cupped member 24 also has a tubular connector 40 extending therethrough and axially thereof and it connects with the tube 16 as at 42.

Under normal conditions of use, the inside

of the cupped member 24 must be maintained sterile and when not connected to a container 12, a cap 42 is threaded over the threaded shoulder 44 of the cupped member 24 and the enclosed space is filled with a sterilizing solution, such as Providin. The clip 26 is closed to prevent the Providin from traveling through the tube to the patient. A skirt 48 extends over the free end of the cap 42. A guide pin 50 extends substantially beyond the cap and engages in the tubular connector 40 to ensure proper alignment of the cap over the cupped member 24 as the cap member and cupped member are connected and disconnected. In use, one usually puts a slight excess of sterilizing solution into the cap so that the excess is forced out through the loose fitting threaded connection between the cap and the cupped member to ensure sterility of the abutting walls of the connected parts.

In the embodiment of the invention illustrated in Figure 5, the cupped member 24 is flared outwardly to assist its alignment with the inside wall 23 of cupped member 20. This assistance in alignment is of very significant practical importance because it provides a facility of handling without contamination in the case of persons who are not in the best of health. It makes it easy for them to make the interconnection without significant danger of touching the sterile connectors of the unit. In use, they grip the cupped members by their outside walls only.

In use, a patient desiring to drain dialysate solution in the peritoneal cavity takes the connector 24 and removes the cap 42 as indicated in Figure 4 of the drawings. He handles the cupped member only by its outside wall. He, then, connects the connector 40 to the connector 28 of an empty dialysate bag 52 which is mounted at an elevation lower than the peritoneal cavity.

Figure 5 illustrates the bringing together of the cupped members 24 and 20 to unite the connectors 40 and 28. It will be noted that the connectors being aligned in their respective cupped members, telescoped together in fluid-tight relation within the space defined by the cupped members as the cupped members are telescoped together. Figure 6 illustrates the cupped members fully telescoped together with the connectors in fluid-tight relation. The final stages of the interconnection are achieved by screw-threading the connectors together and, it will be noted that the threaded barrel portion 44 threadedly engages with the threaded surface 34 to give a good mechanical advantage to the telescoping action as the membrane 32 of the connector 20 is broken.

It will be noted that connector 40 pierces the membrane 32 of connector 28 and thereby establishes a fluid-tight connection within the cupped members.

It is not necessary that the end of spiked connector 40 should be a fluid-tight fit with the walls of the connector 28 because the fluid-tight connection is achieved at the membrane 32.

The connector 40 is spaced inwardly of the wall of the cupped member 23 as the cupped members are brought together and separated. The telescoping cupped members guide the connectors towards each other in a manner that the connector 40 cannot become contaminated because it does not touch anything as it is moved to and from the connecting position. Connector 28 is, of course, well within the cupped member and it is relatively inaccessible for contamination.

The patient then removes clip 26 from the tube 16 and the solution drains from the peritoneal cavity to the bag 12.

When drainage has been completed, the cupped members and their connectors are separated and the cupped member 24 with its connector 40 is connected to a cupped member 20 with its connector 28 on a full bag of fresh dialysate. The connection is made in the same manner. Preferably, the cap 50 with a quantity of sterilizing solution is applied to the cupped member 24 and then removed before it is connected to the connector on the full bag of dialysate to sterilize the cupped member and its connector but this is not necessary if care is taken.

The flared end of the cupped member 24 is of considerable assistance in assisting a patient to bring the cupped members and connectors together without touching the connectors. The cupped member 20

can easily be manipulated by handling its outside surface near its base. Similarly, the cupped member 24 can be handled near its base by gripping the skirt 48 thereof.

5 Figures 8 and 9 illustrate a further embodiment of the invention. In these Figures, a cupped member 54 has a connector 56 extending there- through which is adapted to connect to the neck of a plastics container for dialysate or the like as
10 at 58. A cupped member 60 has a connector 62 therein which is adapted to connect at its free end with a tube 16 of a catheter. In use, the open ends of the cupped members telescope together as illustrated in Figure 9 and their respective axially aligned con-
15 nectors telescope together in fluid-tight relation within the space defined by the cupped members as the cupped members are telescoped together. Connector 56 does not, in this case, have a severable membrane thereacross but flow can be cut off in the tube 58
20 that connects with it by means of a clip similar to the clip 26. Here again, however, the basic idea of connectors shielded by manually manipulatable cupped members that have a base that can be easily manipulated by the hand so that, as the cupped members are telescoped
25 together, contamination by contact with the hand of the connectors is not likely.

 In the case of the connector of Figures 8 and 9, the connectors frictionally engage with each other

to form a fluid-tight connection. There is no membrane associated with one or other of the connectors for the purpose of achieving a fluid-tight connection in this embodiment.

5 The cupped members 54 and 60 each have caps 64 and 66 respectively which are applied thereto when the members themselves are not connected. Here again, a sterilizing solution can be applied in the cap.

10 Figure 10 illustrates a further embodiment of the invention. In this case, the cupped members 68 and 70 each have axially aligned connectors 72 and 74 mounted within them which are designed for connection to tubular members as at 76 and 78 respectively. The cupped member 70 is telescoped within the cupped member 68 by manual manipulation of the exterior of the cupped members and the final stages of securement are achieved as the threaded inside 80 of the cupped member 70 threads over the threaded shoulder 82 of the connector 72.

15 The connector 74 is a rigid tube and has openings 84 adjacent its free end which permit flow therethrough. The front end of the tube is pointed as at 86 and, as the cupped members are brought together, the pointed ends 86 of the connector 74 pierces the membrane 88 that seals the connector 76.

20 It will be apparent that when the two cupped members are telescoped together that flow can take place from the tube 76 to tube 78 or vice versa.

It will be noted that the cupped members are, in some cases, formed with a flat section at one end as at 90 in the case of cupped member 24. These give the user a surface that can be used for the purpose of turning the cupped members relatively to each other for the purpose of securing the threaded connection between them that has been referred to above.

In use, one of the cupped members will most likely be connected to the dialysate bag as illustrated in Figure 2 at the time the bag is filled. It will be disposed of as the contents are drained in most cases.

After a bag of dialysate has been drained into the peritoneal cavity of the patient, the patient will, of course, disconnect the cupped member that is attached to his catheter tube 16 and apply its cap to maintain its sterility as indicated above. The empty dialysate bag can be stored and used to collect the drainage. In such a case, a cap should be applied to the cupped member while it is not in use to maintain sterility of the connector during the interval. Alternatively, a fresh empty bag with a cupped member that is maintained in sterile packaging can be used for drainage.

When the connector of Figures 2 to 6 is used to drain dialysate from the patient and the same bag that supplied the dialysate is used to take the drainage, the membrane 32 of connector 28 will have been broken

previously to the making of the drainage connection.

In this particular case, the connection between the connectors may not be fluid-tight because the membrane has been previously broken. This, however, is not of any real concern in the case of a drainage use because the bag is low and there is a very low pressure on the connection.

Embodiments of the invention other than those illustrated will be apparent to those skilled in the art and it is not intended that the foregoing drawings should be read in a limiting sense.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A coupler comprising

a first cupped member having a tubular connector extending through the bottom thereof and axially thereof;

a second cupped member having a tubular connector extending through the bottom thereof and axially thereof;

said cupped members, when axially aligned and with their open ends opposed, being telescopable with respect to each other;

said connectors of said cupped members having free ends, said free ends of said connectors being aligned in their respective cupped members and adapted to connect together in fluid flow relation within the space defined by said cupped members as the cupped members are telescoped together, one of the cupped members being adapted to receive the connector of the other cupped member in spaced relation to its interior wall as the cupped members are telescoped together to connect said connectors as aforesaid;

a wall of one of said cup members being flared outwardly adjacent its lip to guide said cup members into alignment as they are telescoped together.

2. A coupler as claimed in Claim 1 wherein the side of said cup member that is flared outwardly as aforesaid embraces the tubular connector of the other cup to guide

said members into alignment as they are telescoped together as aforesaid.

3. A coupler as claimed in Claim 2 wherein the free end of said tubular connector that is embraced by said cup member that is flared outwardly extends outwardly of the open end of said cup member.

4. A coupler as claimed in Claim 1 or Claim 2 wherein said cupped members are threadedly engageable with each other as they are telescoped together.

5. A coupler as claimed in Claim 1 or Claim 2 wherein said cupped members are threadedly engageable with each other as they are telescoped together, one of said cupped members being threaded to threadedly receive the inside wall of the other cupped member.

6. A coupler as claimed in Claim 1 or Claim 2 wherein one of said cupped members has a skirt adjacent its base, said skirt being adapted to telescope with respect to the side of the other cupped member as said cupped members are telescoped together as aforesaid.

7. A coupler as claimed in Claim 1 or Claim 2 wherein at least one of said cupped members has a cover for its open end, said cover being adapted to threadedly engage therewith to form a fluid chamber that houses its connector.

8. A coupler as claimed in Claim 1 or Claim 2 wherein one of said cupped members has a skirt adjacent its base, said skirt being adapted to telescope with respect to the side of the other cupped member as said cupped members

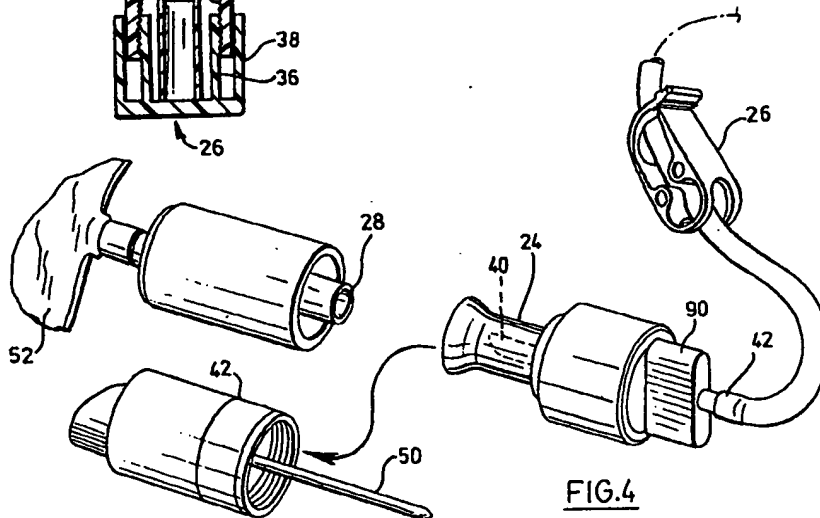
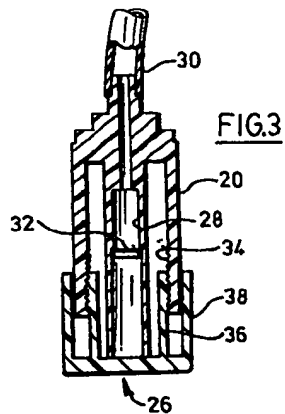
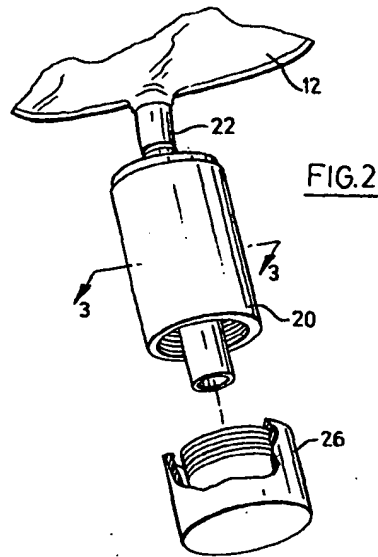
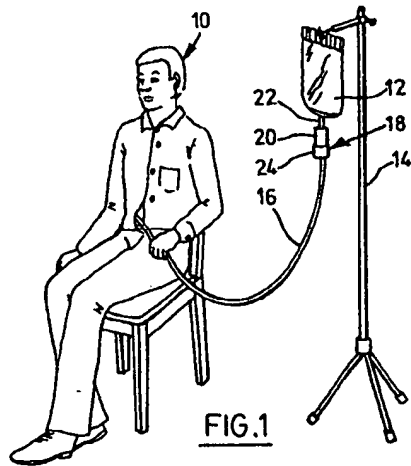
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are telescoped together as aforesaid.

9. A coupler as claimed in Claim 1 or Claim 2 wherein said cupped members have covers for their open ends, the cover of at least one of said cupped members being adapted to threadedly engage therewith to form a fluid chamber within its respective cupped member.

10. A coupler as claimed in Claim 1 or Claim 2 but connected to a container for fluid.





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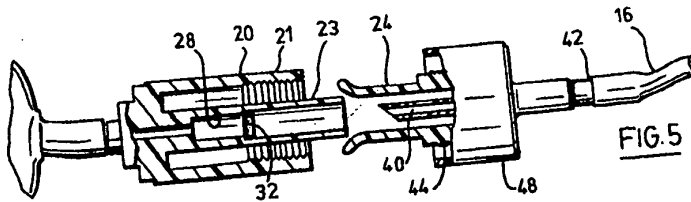


FIG. 5

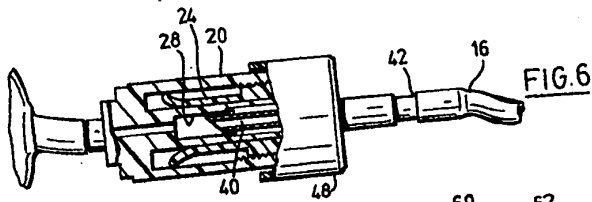


FIG. 6

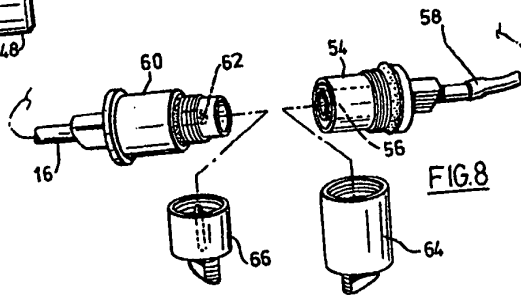


FIG. 8

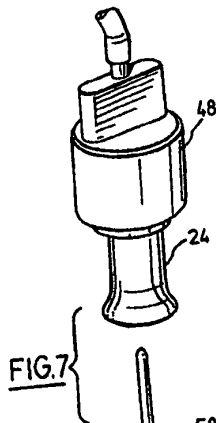


FIG. 7

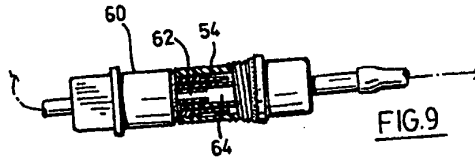
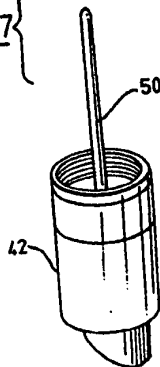


FIG. 10

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